PLANAR LIGHTWAVE WAVELENGTH DEVICE USING MOVEABLE MIRRORS

ABSTRACT

A method and apparatus are disclosed for adjusting the phase of an optical signal by varying the path length of the optical signal using one or more moveable mirrors. The phase adjustment techniques of the present invention may be employed in various optical devices, including 1 x *n* optical switches. The position of the mirrors may be controlled, for example, using micromachined control elements that physically move the mirror along the lightpath. An exemplary 2-by-2 optical switch includes two waveguides configured to include a coupler region. A mirror is positioned at the output of each waveguide. The position of at least one of the mirrors may be adjusted along the optical path and the mirrors reflect the light exiting from the end of the waveguides back into the same waveguide after an adjustable phase delay due to the round trip through an adjustable air gap between the waveguides and corresponding mirrors. A received optical signal is split in the coupler region into two generally equal components and the phase of at least one component of the optical signal is adjusted by controlling the relative position of the mirrors. The optical components are then recombined and the optical signal appears at the appropriate output port of the optical switch. The present invention may also be applied in wavelength selective optical switches that support multiple optical channels. A number of techniques are also disclosed for fabricating optical devices in accordance with the present invention.